ACNET and Shot Setup

- **ACNET**
  - navigation, plotting data, recording downtime
- **Shot Setup**
  - Terminology & Overview
  - Checklist & flowchart

Phillip Koehn

Ace Training
April 9th 2003

ACNET

- What is ACNET ?
- How to start/run ACNET.
- Navigating in ACNET.
- Plotting data in ACNET.
- Downtime logger

What is ACNET ?

- Accelerator Network
- Developed by the FNAL Controls Group
- Monitor information throughout the accelerator
  - Beam currents
  - Luminosity
  - Losses
- Separate devices for Tevatron, Main Injector, experiments

Starting ACNET

- ACNET runs on PC on the West side of the Control Room – rack 2RR03G
- Should already be running
- Automatically starts after reboot
- If it crashes or is unresponsive, do this get it going again:
  - START
    - Programs
    - Acnet
    - Cnsrun

3 sets of 5 windows

- PA – Primary Applications
- PA: Touch Panel
- GxSA – Secondary Applications
- GxPA:1 – Graphics Window
- GxPA:2 – Graphics Window

3 Groups – A, B, C

Additional Utilities Window

Primary Applications Window

```
E                EXPERIMENT-RELATED PROGRAMS                ◆Cmnds◆◆Pgm_Tools◆
  1                          24 UNUSED PARAM PAGE     47 SILICON-PARAMETERS
  2                          25 UNUSED PARAM PAGE     48 SVX TEST BARREL
  3                          26 UNUSED PARAM PAGE     49 CMP/CMX LV
  4 CDF ALARMS MONITOR       27 UNUSED PARAM PAGE     50 VTX/CTC LV&TEM
  5 ALARMS STARTER           28 GAMMA HI VOLTAGES     51
  6 ALARM ENABLE             29 UNUSED PARAM PAGE     52 UNUSED PARAM PAGE
  7                          30 UNUSED PARAM PAGE     53 UNUSED PARAM PAGE
  8 CDF DOWNTIME LOG         31 UNUSED PARAM PAGE     54 UNUSED PARAM PAGE
  9 EXAMINE DATABASE         32 UNUSED PARAM PAGE     55
 10 DEVICE LIST I/O          33 UNUSED PARAM PAGE     56 FORWARD GAS FLOW
 11 E-Z WRITER               34                       57
 12 UNIGNORE ALARMS          35 D0 SMI LOSS MON.      58 DZERO PARAMETERS
 13                          36 UNUSED PARAM PAGE     59 ELECTRON COOLING
 14 UNUSED PARAM PAGE        37 UNUSED PARAM PAGE     60 VTX PARAMETERS
 15 UNUSED PARAM PAGE        38 UNUSED PARAM PAGE     61
 16                          39 UNUSED PARAM PAGE     62 B0 BACKGROUNDS
 17 MONITOR                  40 FMU & RPOT PISA       63 RADMON
 18 ELECTRON COOL/NEF        41 E868 APEX PARAMS      64 MON STORE
 19 ELECTRON COOL VAC        42 E811 PARAMETERS       65 CMP,CMX,CMU (PC1)
 20 SVX LOSS MONITOR         43 CSX PISA SCINTILL     66 RPOT, FMU (PC2)
 21 EXPORT MANAGER           44 E864 MINIMAX          67 FIN,PIN,FEM,PEM P3
 22                          45 E811 COMMANDER        68 CTC (PC4)
 23 SHOW UPDATE TIMES        46 E811 ALARM DOWNLD     69 CES,CCR,CPR (PC5)
```

Navigating in ACNET

- You will type wherever the cursor is.
- Move the cursor over the character where you want to type.
- Left mouse button works like "return".
- On index page, either click on the page number, or type in Top Left Corner.
- To get back to the index page, type letter of desired index page in the Top Left Corner.

Many Index Pages

B – Booster
C – Collider
D – Diagnostic/Utility
E – Experimental
I - Main Injector
L – Linac
P - PBar
R – Recycler
T - Tevatron

Some Useful and Essential Pages

- C65 Collider Luminosity
- D44 Lumberjack Plotter
- E8 Downtime Data Logger
- E11 E-Z Writer – great for making livetime plots
- E20 SVX Loss Monitor
- E48 Silicon Alarms/Aborts
- E64 Monitor Store

C65 - Collider Luminosity

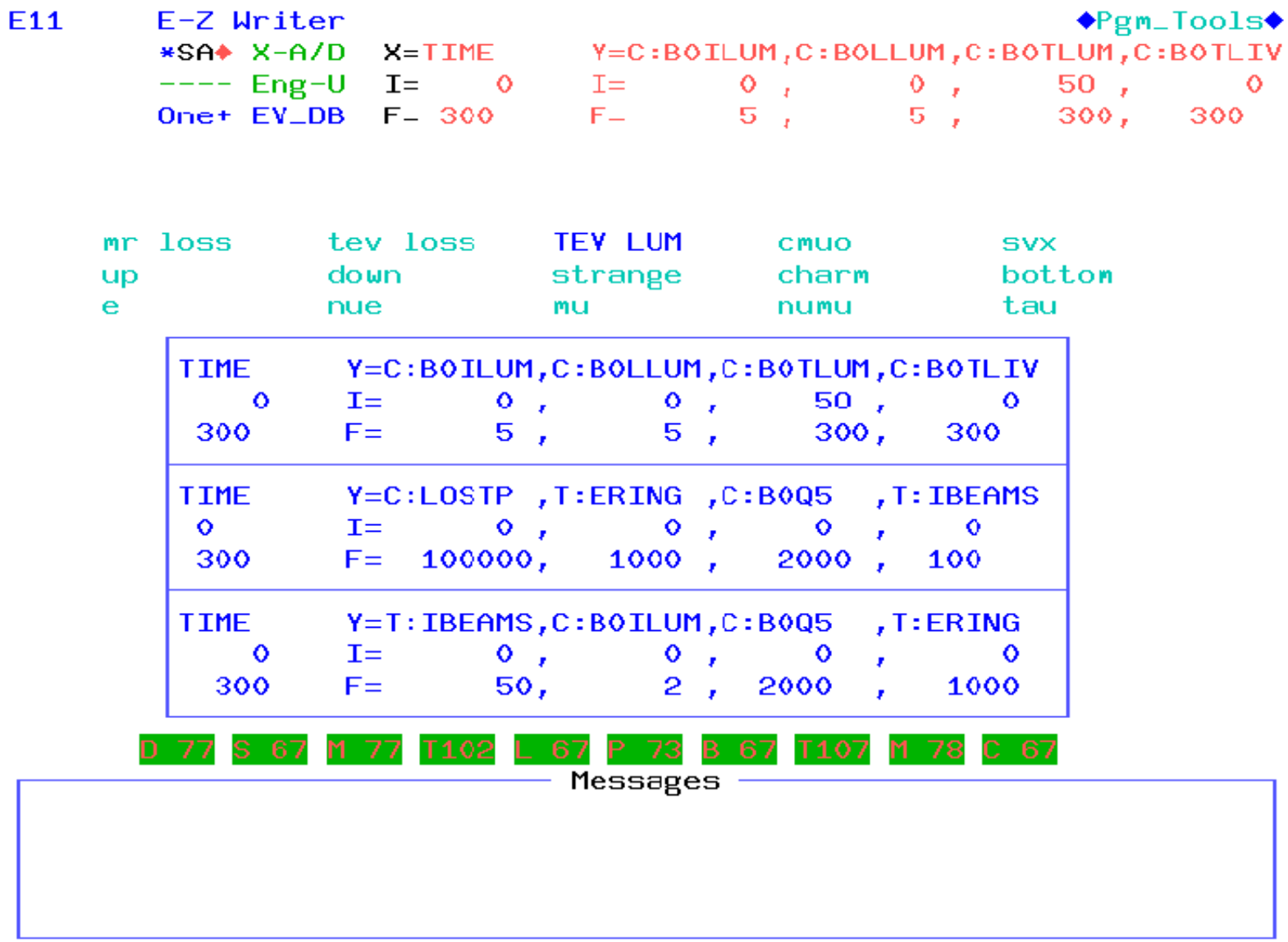
```
C65  LUMINOSITY/LOSS TOTALS          SET      D/A    A/D   Com-U ◆COPIES◆
-<FTP>+ *SA◆ X-A/D   X=TIME      Y=C:B0SOLI,T:ERING ,C:B0Q5   ,T:IBEAMS
COMMAND ---- Eng-U   I= 0        I= 0       , 0       , 0       , 0
-< 1>+   One+ EV_DB  F= 500      F= 100000  , 1000    , 2000    , 100

 C:B0PLOS      B0 Proton Losses                              0      Hz
 C:B0ALOS      B0 Antiproton Losses                          0      Hz
 C:B0ILUM      B0 Luminosity                                 0      E30
 C:B0TLUM      B0 Integrated Luminosity                   5440      nb-1
 C:B0LLUM      B0 Live Luminosity                            0      E30
 C:B0TLIV      B0 Live Luminosity Total                     .001    nb-1
 C:B0C13       Tight Min Bias Trigger                        0      Hz
 I:STORE       Present Store Number            56/        56/

 !D0FLTL AND D0FZTL ARE EQUIVALENT (MDC 4/25/01)
 C:D0FLTL      D0 total Fast Z Lum    0         0          0      E30
 C:D0FZTL      D0 total Fast Z Lum    0         0          0      E30
 C:D0PHTL      D0 total prot bunch    .282      .141       .141   Hz
 C:D0AHTL      D0 total pbar bunch    .563      .563       .563   Hz

-C:FBIPNG      TFBI Prot NaroGate Inten         0          0      1E09
 C:FBIANG      TFBI Pbar NaroGate Inten         0          0      1E09
```

E11 - E Z Writer



Important quantities to Monitor/Plot in ACNET

Losses

C:B0PLOS, C:LOSTP - B0 proton losses
C:B0ALOS, C:LOSTPB- B0 anti-proton losses
C:B0PBSM - Proton Abort gap rate
C:B0ABSM - Anti-Proton abort gap rate
C:B0RAT4 - Abort gap gated losses in CMP

Tevatron

T:ERING - Tevatron energy
T:L1COLI - Tevatron Electron Lens Current
T:RFSUM - Tev RF current
T:SBDMS - Avg. Longitudinal Bunch Length
T:RFSUMA - Anti-Proton RF Sum

Luminosity

C:B0ILUM - B0 instantaneous luminosity
C:B0LLUM - Live instantaneous luminosity
C:B0TLUM - Integrated luminosity
C:B0TLIV - Live integrated luminosity
C:B0Q5 - Current in B0 quads

SVX

E:SVRAD(0-3)
E:SVBLA(0,1), SVBLB(0,1)

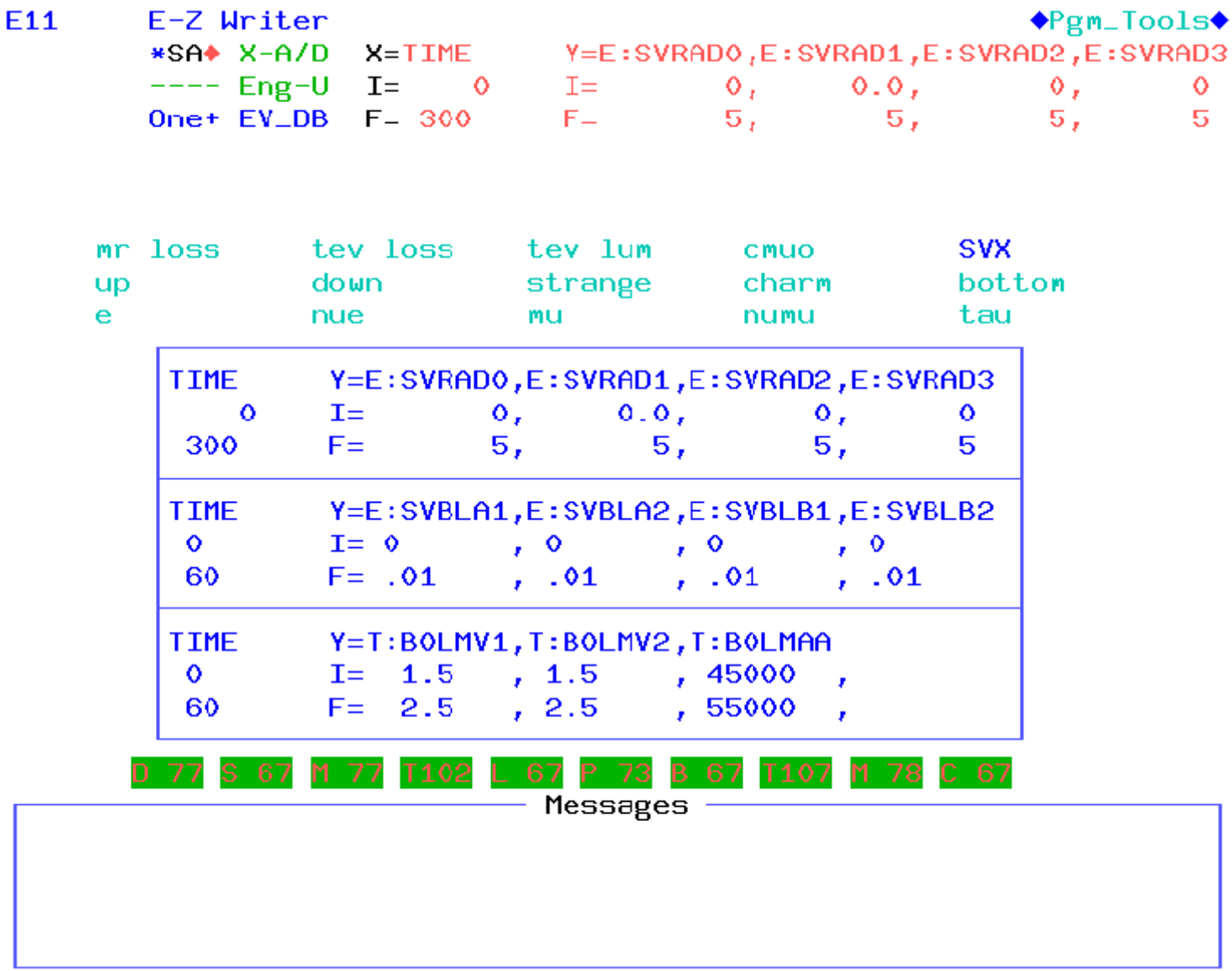
www-cdfonline.fnal.gov/acnet/acnetplots.html
www-cdfonline.fnal.gov/acnet/definitions.html

Plotting Data

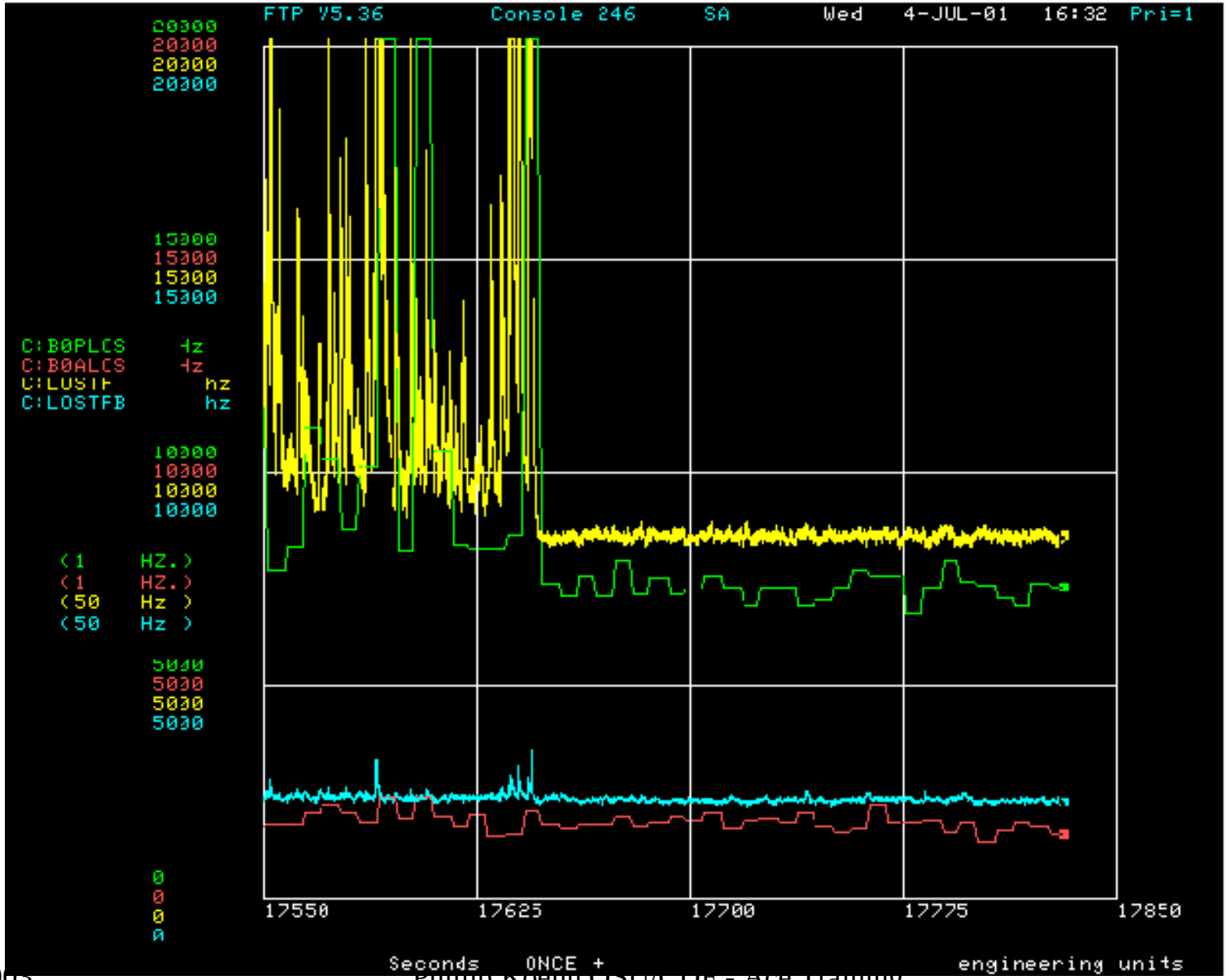
Two ways to plot

- Real-time plots
  - Fast-time plotter
  - Accessible from E-Z Writer
  - Accessible from top left corner of most pages
- Plots of stored data
  - Lumberjack data logger
  - Plot from page D44
  - Devices listed on page D43
  - X = Time, Y = Device

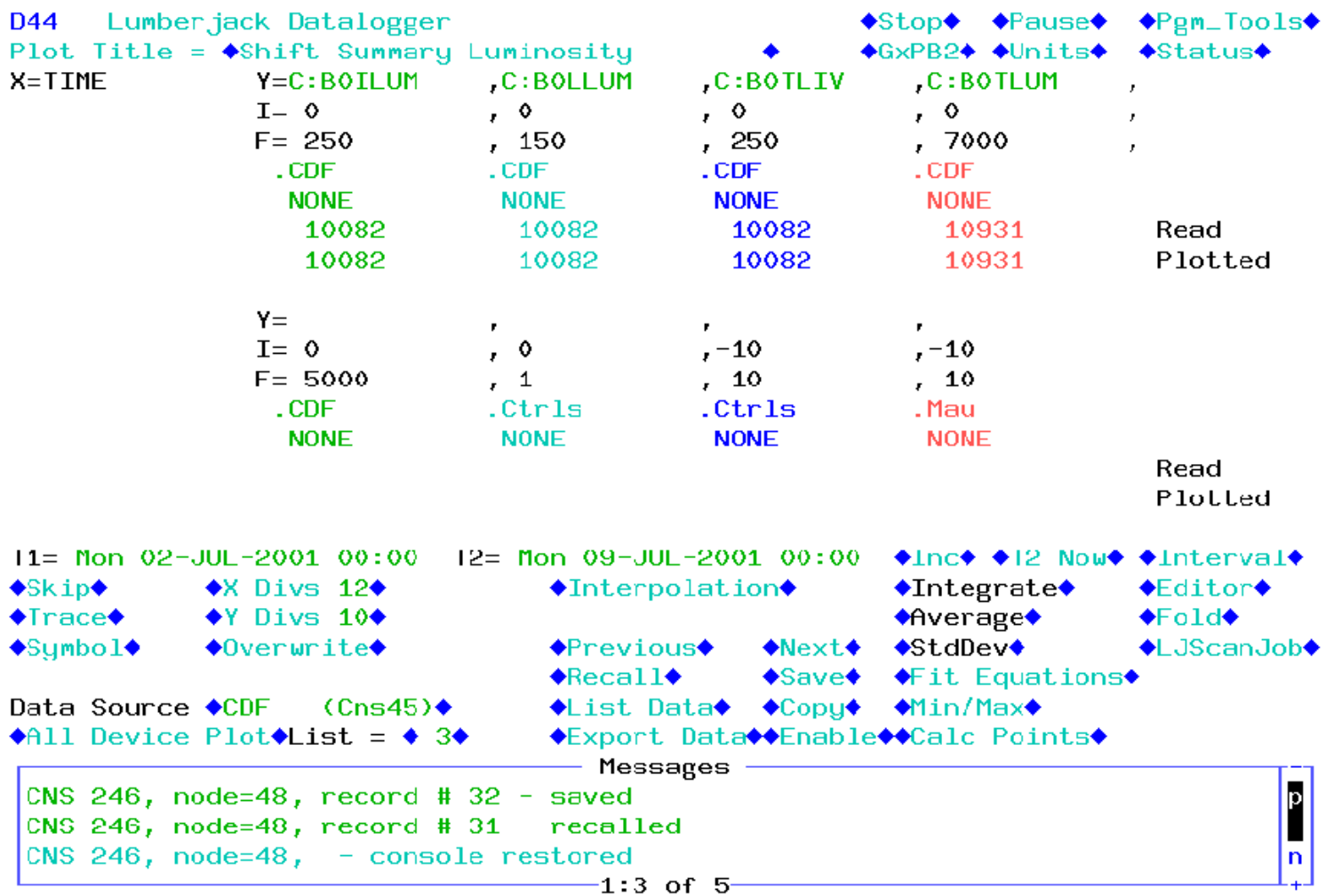
Real time plotting



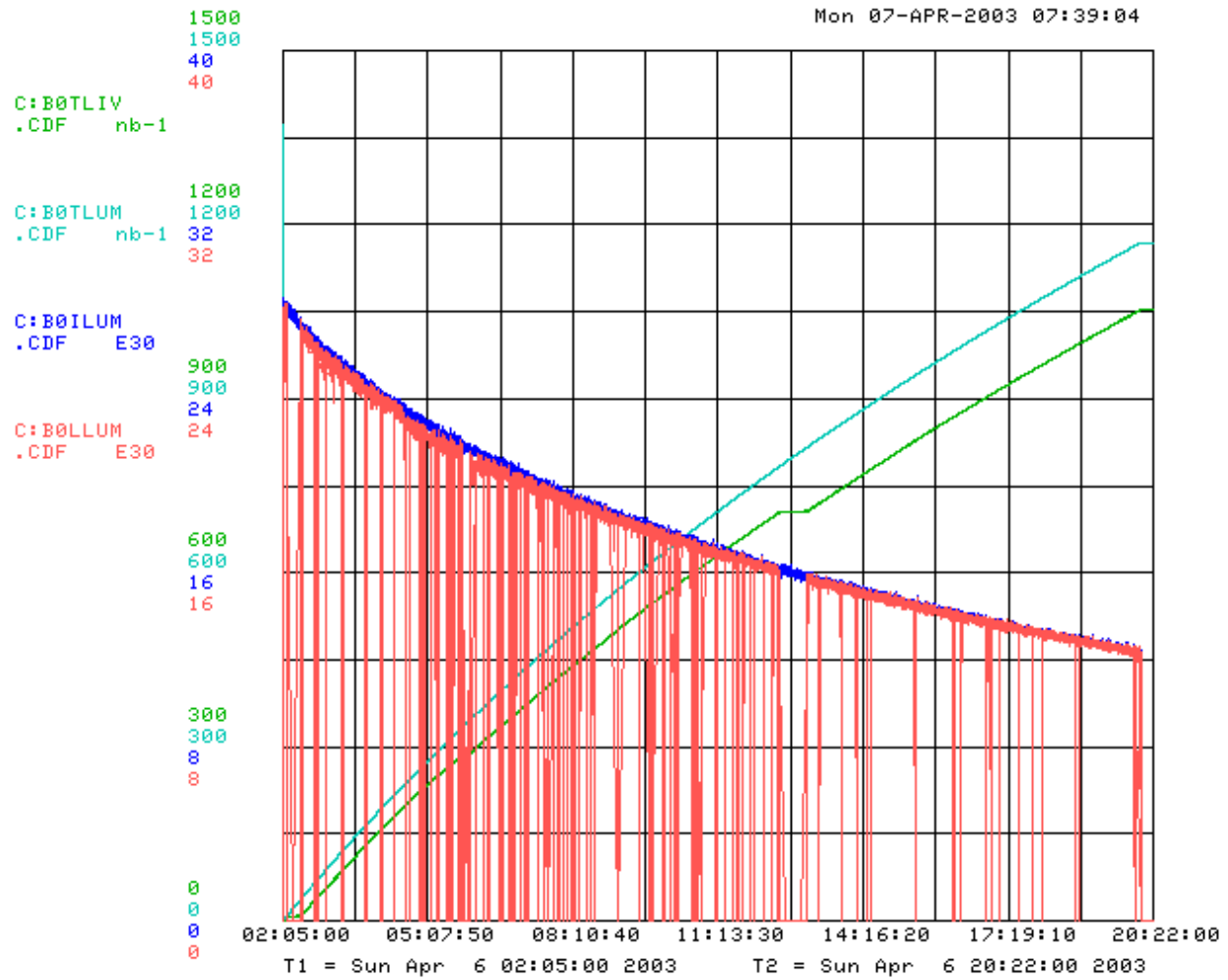
Real time plotting



Plots of stored data
D44: Lumberjack Datalogger



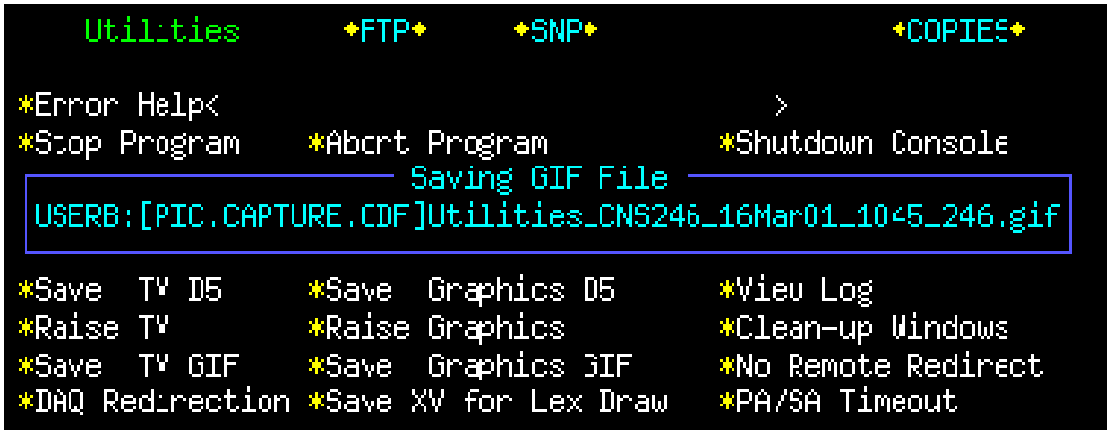
Plots of stored data
D44: Lumberjack Datalogger



End of shift summary

Want summary of luminosity, svx rads in e-log

- Should have lumberjack plots already formatted
- Use RECALL to bring up saved format
- Save file to disk (save as gif)
  - Use utilities window

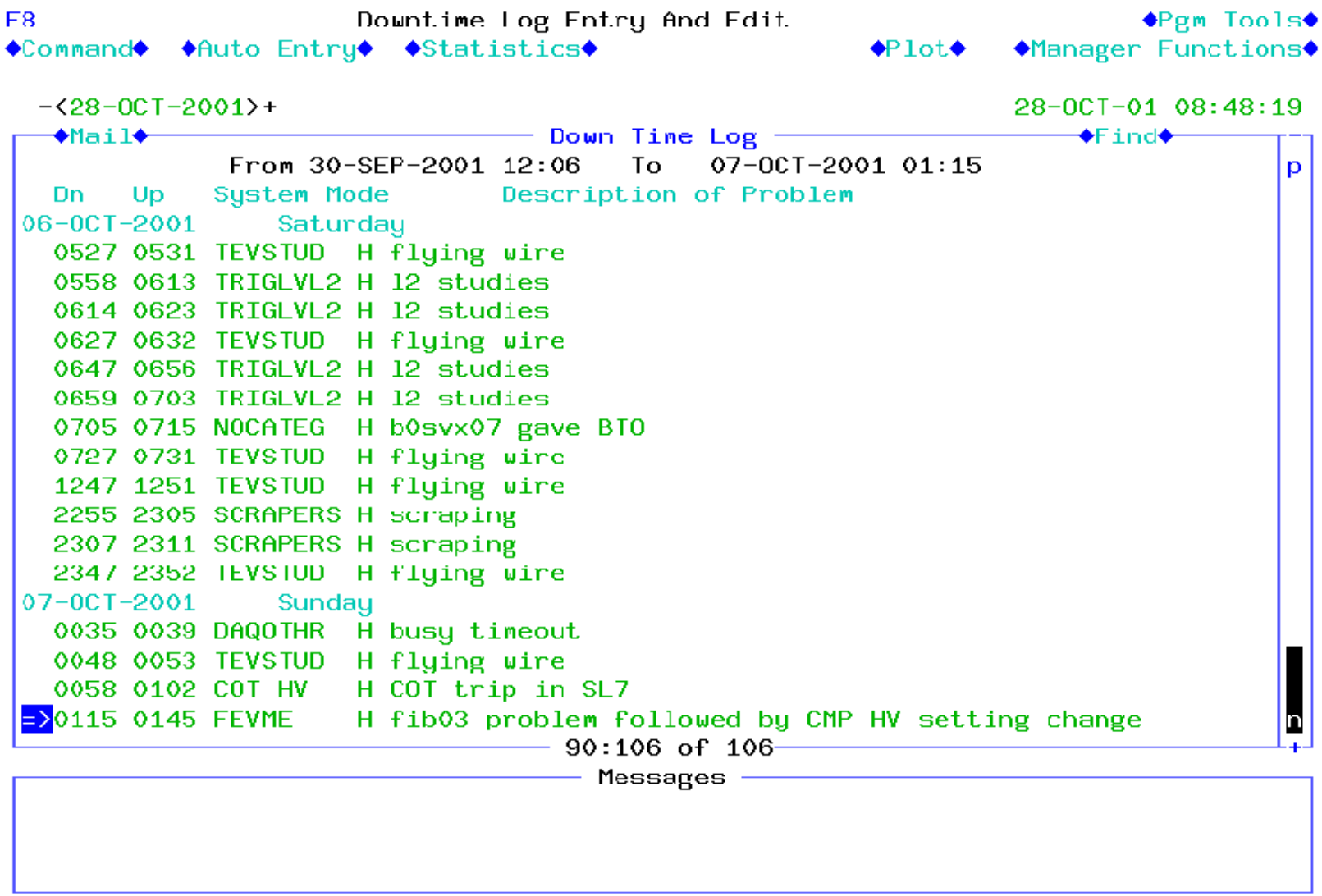


  - Save to gif
  - Save in [PIC.CAPTURE.CDF]
- Import to e-log

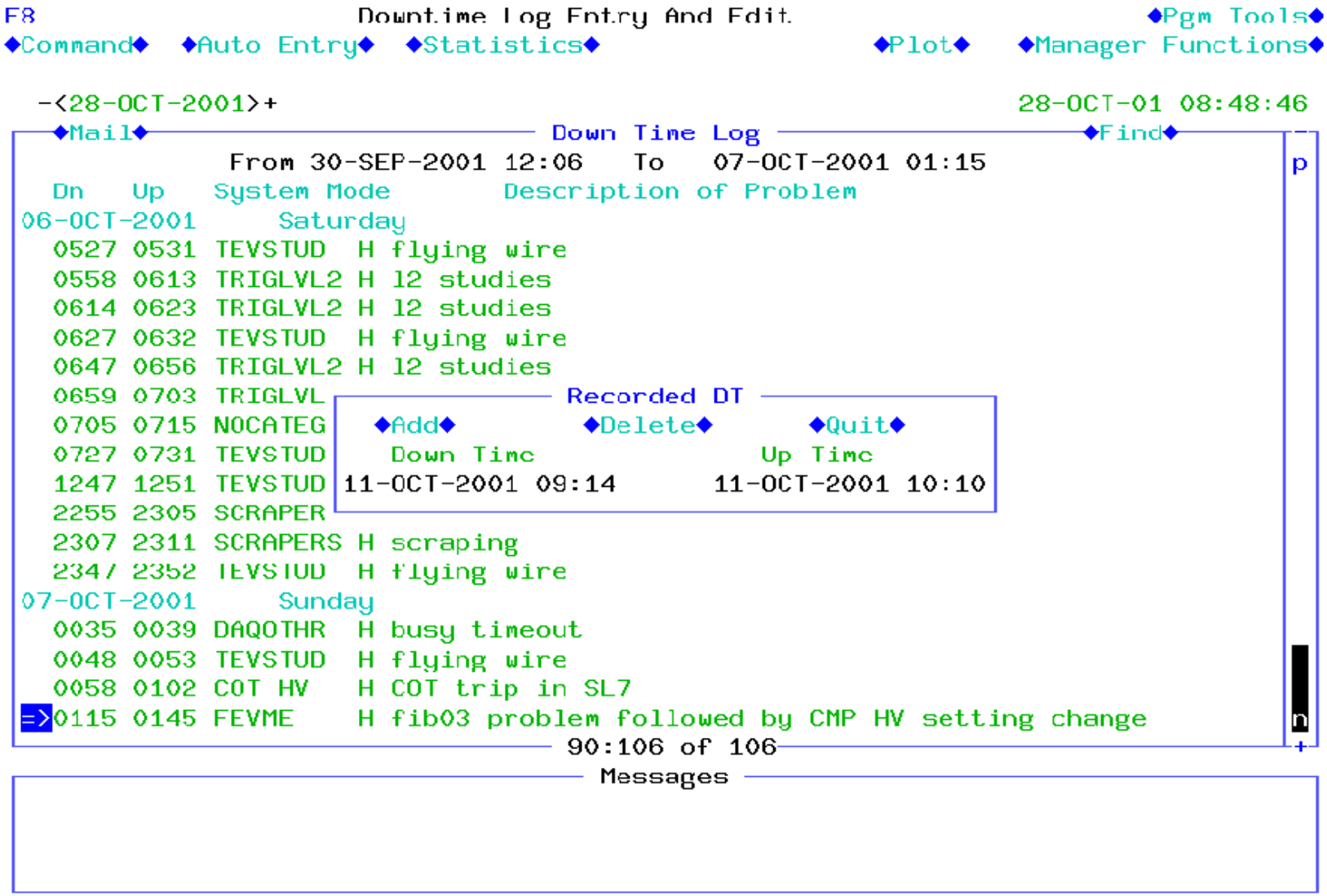
Page E8 - CDF Downtime data Logger

- When data-taking stops for more than 2 minutes, an entry is generated automatically.
- Shift crew must edit to categorize downtime
  - HV
  - DAQ
  - Trigger
  - Level3
  - etc, etc
- Downtime logger category names
  - www-cdfonline.fnal.gov/acnet/downtime_names.html
- Allows for downtime accounting later

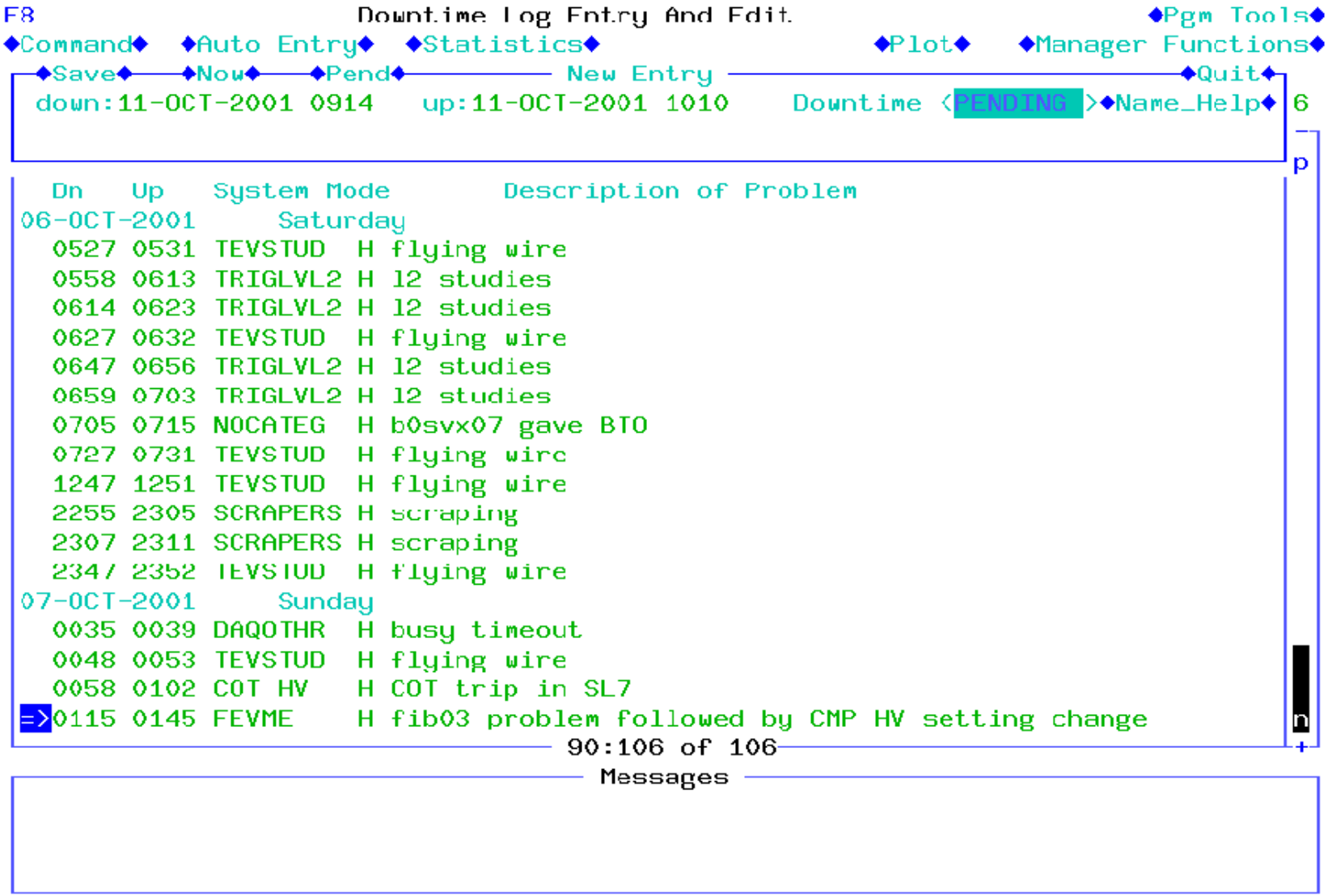
Page E8 - CDF Downtime data Logger



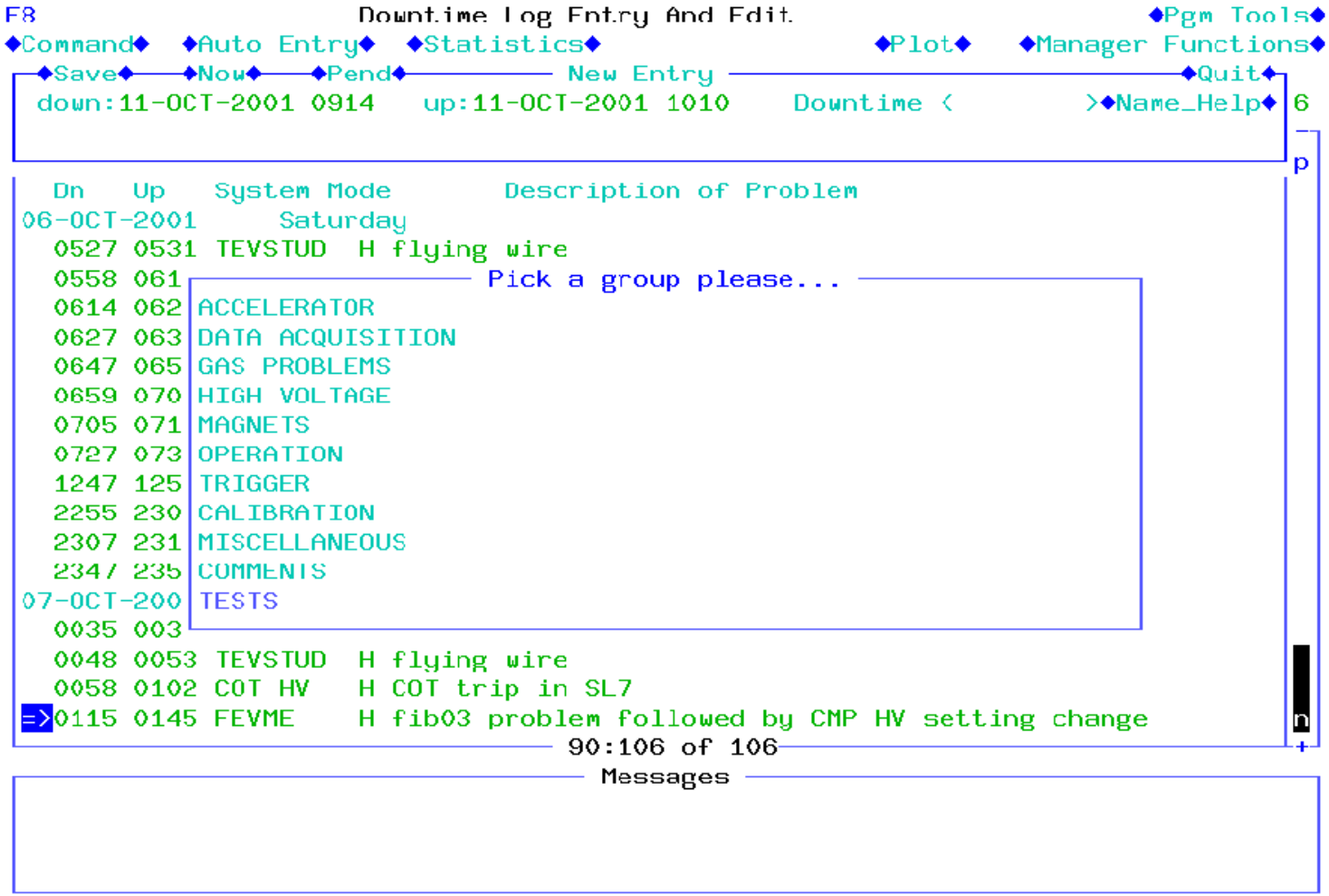
Click AUTO ENTRY to bring up pending entries



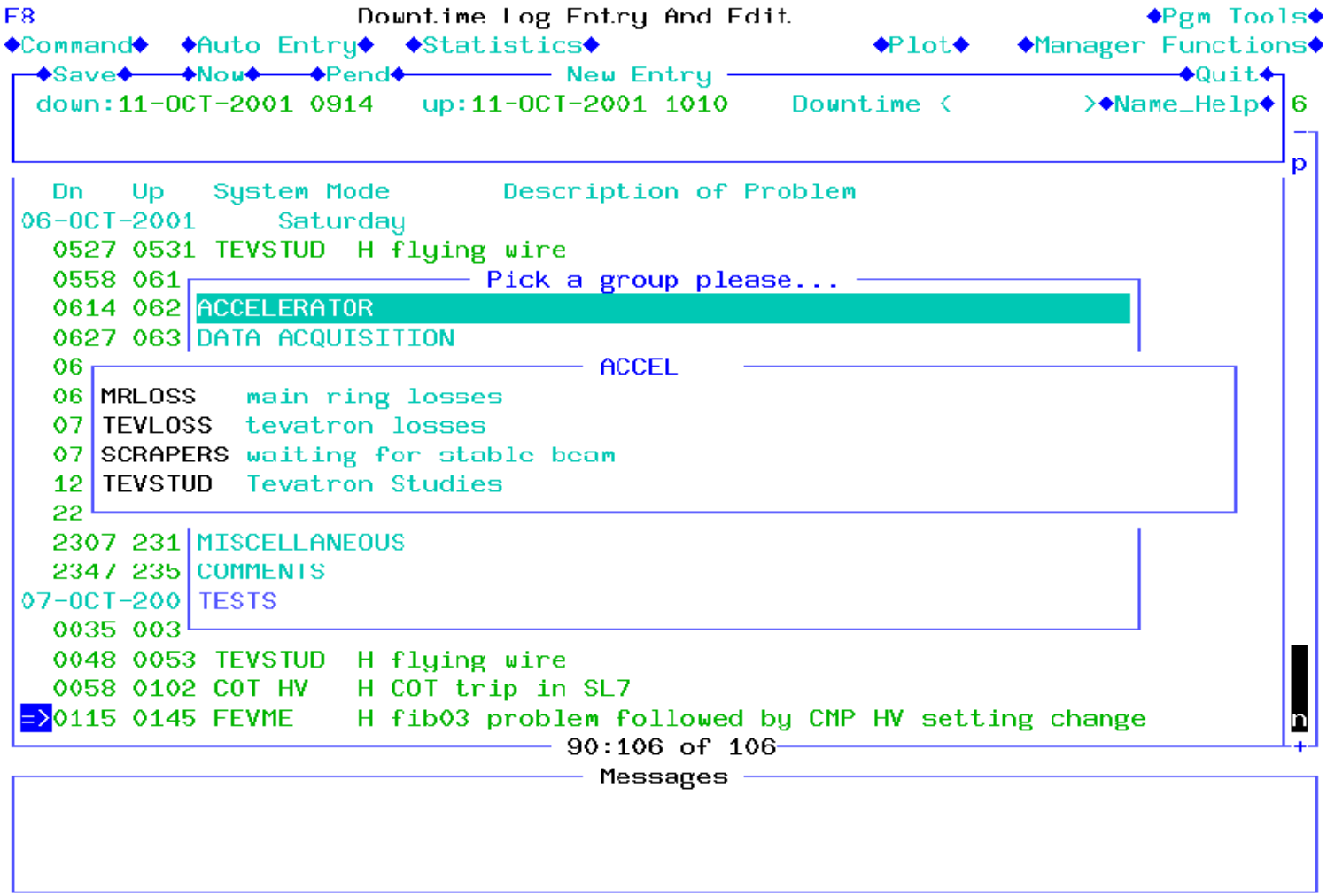
Click ADD and choose an entry from the list



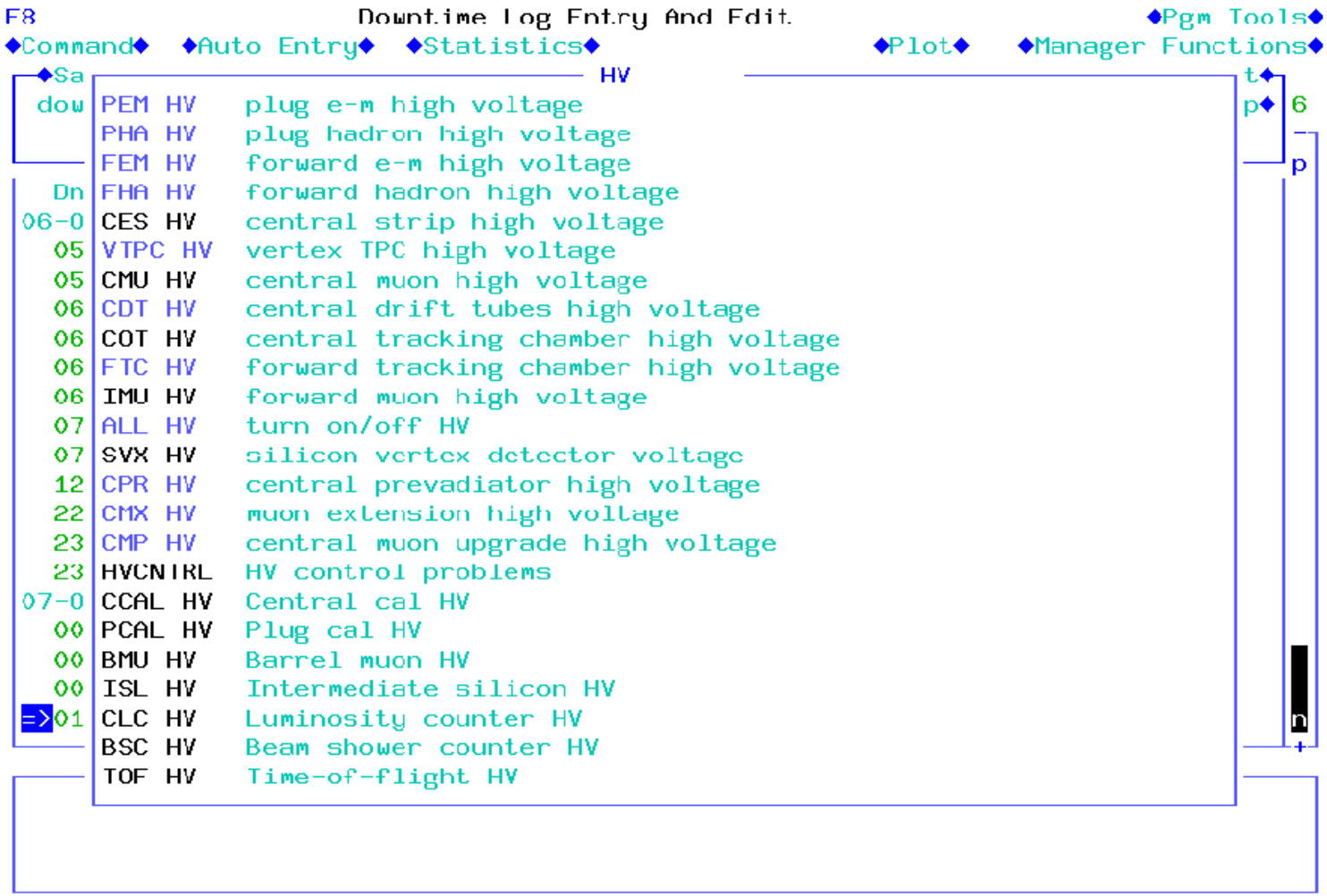
Click NAME HELP to list the major categories.
Click on category to get a list of subcategories.



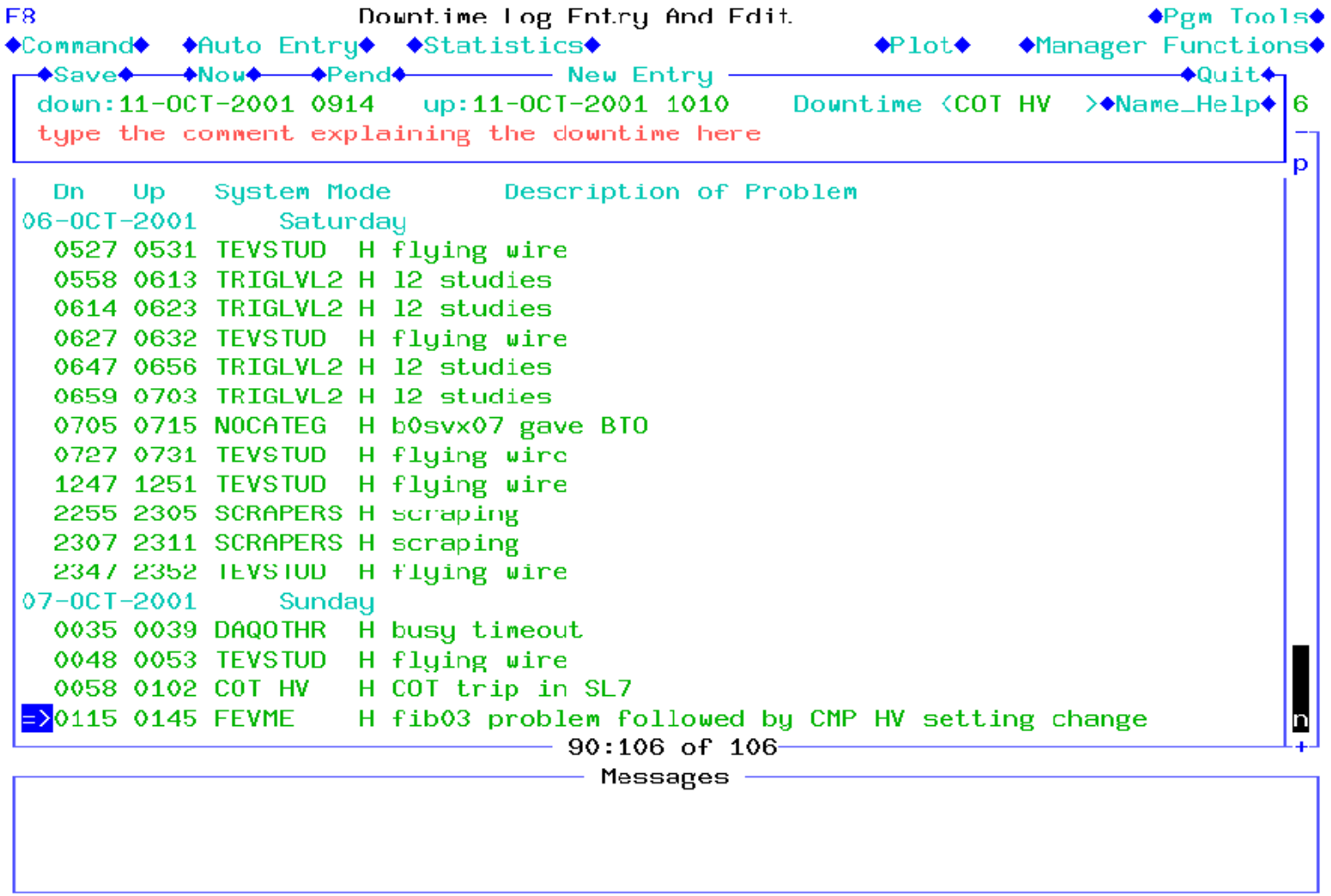
Possible categories under ACCELERATOR. Click on one to copy it to the DOWNTIME field.



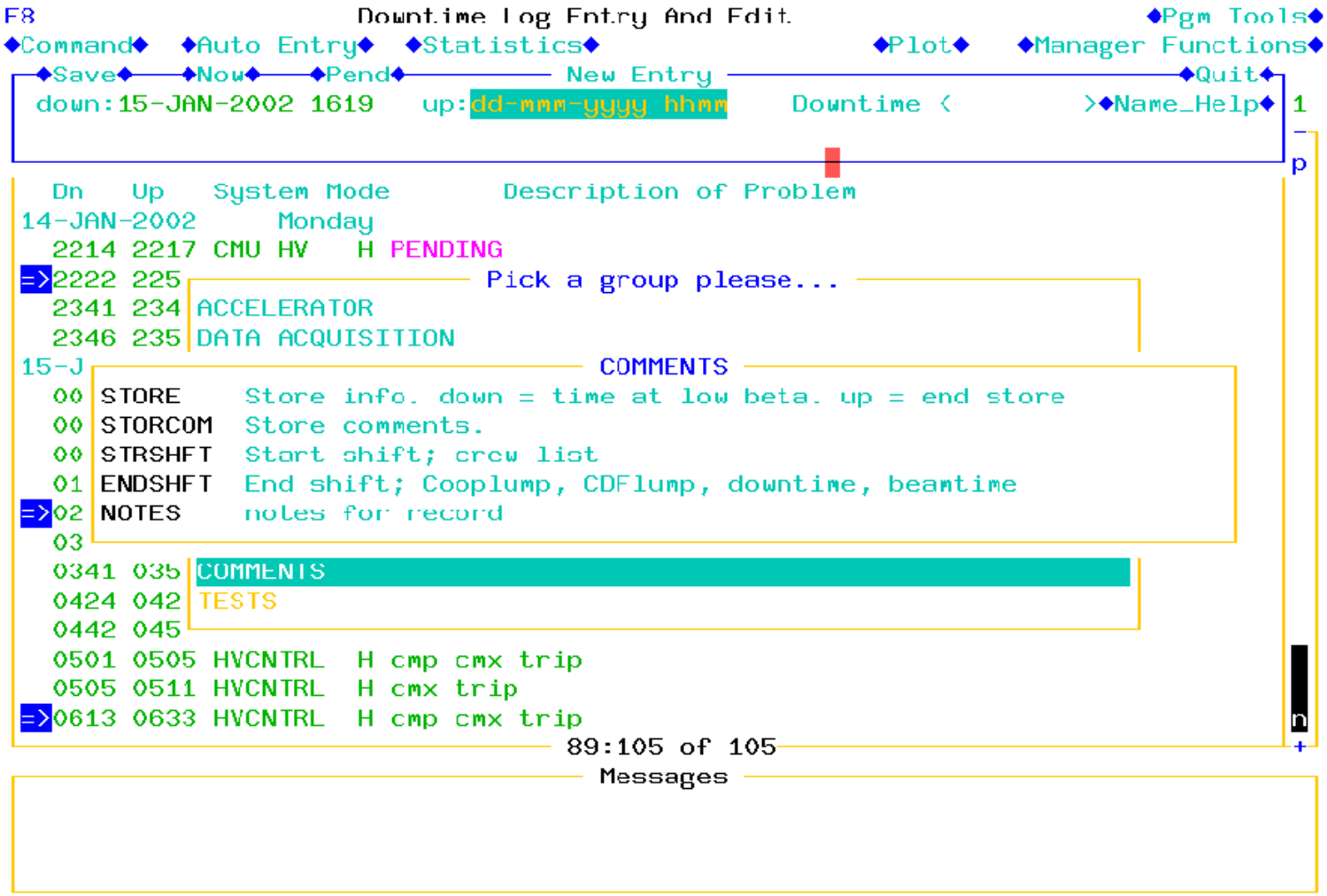
Possible categories under HV.
Click on one to copy it to the DOWNTIME field.



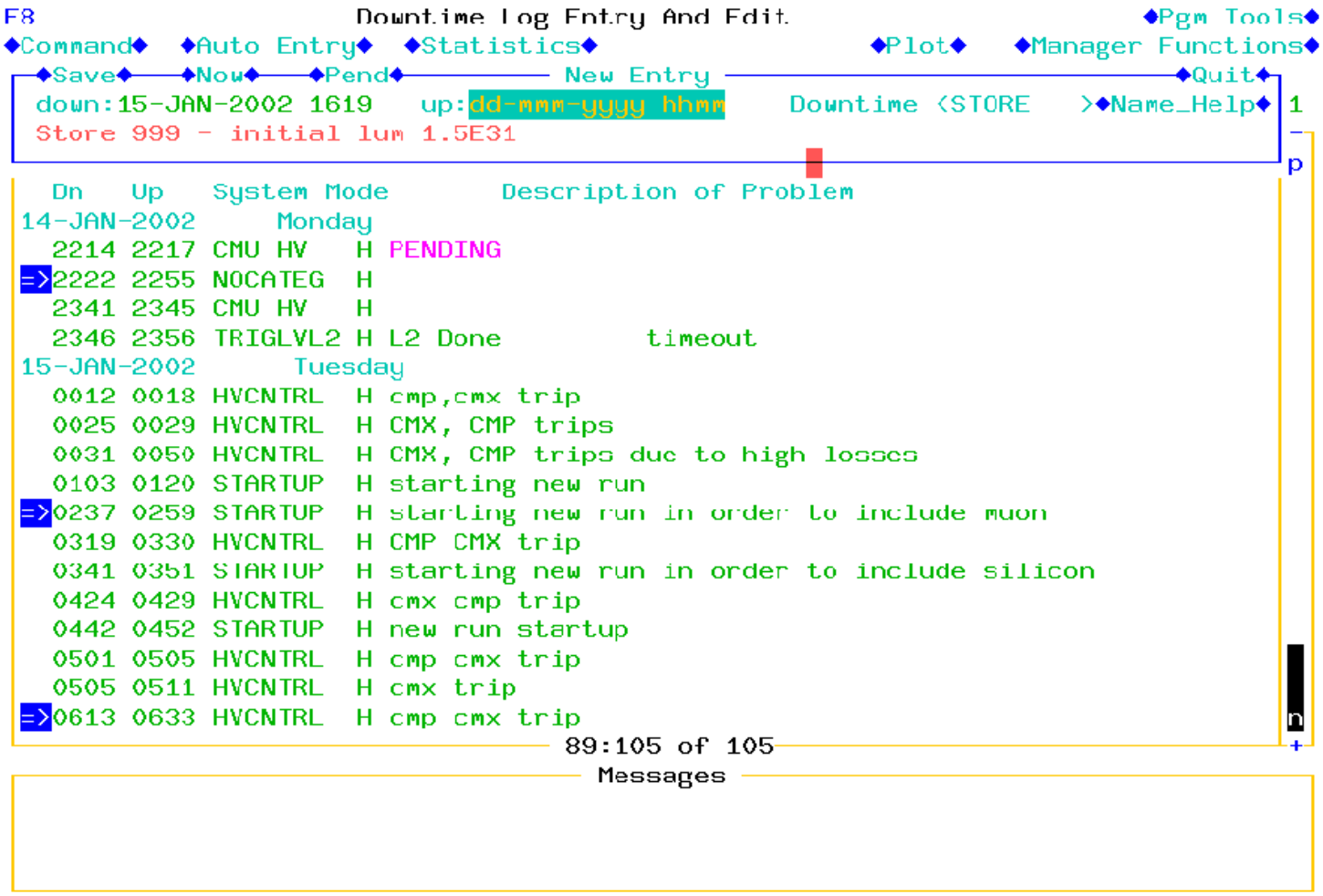
Type in comment then click SAVE to commit the new entry



When a new store goes in, enter as COMMENT. Not an auto entry, so use ADD ENTRY



DOWN time is when scraping is complete (t_0 for start of the store). Fill the UP time at the end of store. COMMENT should include store # and initial luminosity.



ACNET resources

http://www-cdfonline.fnal.gov/acnet/acnet.html

Web Tutorials by John Yoh, et al.

- www-cdfonline.fnal.gov/acnet/acnetplots.html
- 4 *fresh and exciting* tutorials.

Aces' Shift ACNET Plots

- www-cdfonline.fnal.gov/acnetplots/acnet.html -

Accelerator Division Web Pages

- www-bd.fnal.gov/acnet/
- Information about all acnet pages

Shift crew resources:

- **Bug your overlap ACE buddy, operations manager, JJ, and Steve Hahn !**

Shot Setup

- Terminology
- Overview
- Checklist

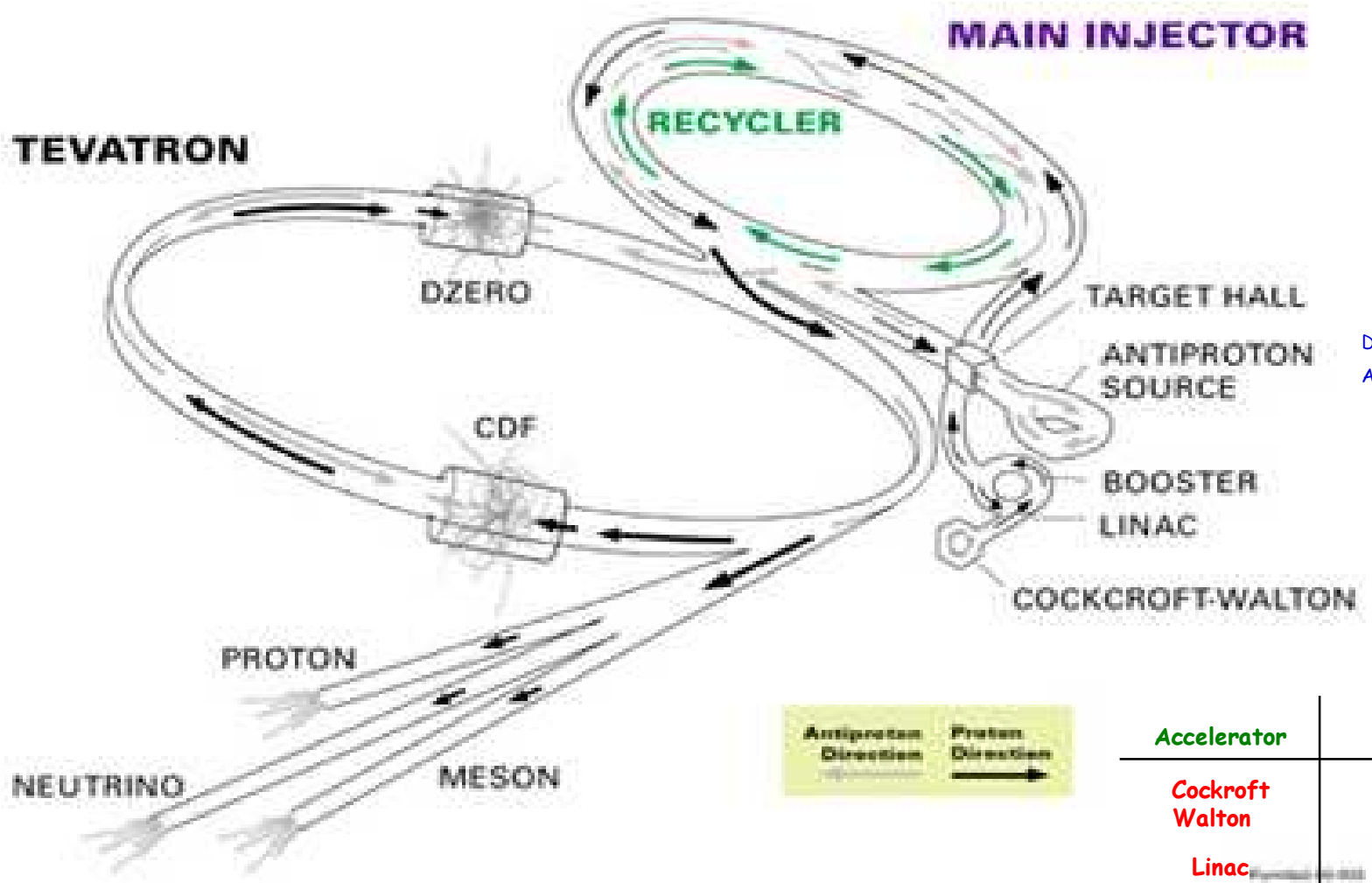
Shot Setup Terminology

- **Store** – when there is a steady particle beam present in the Tevatron
  - Usually with both protons and anti protons
  - Numbered sequentially
  - Can last from minutes to hours to days
  - Can sometimes end abruptly

Shot Setup Terminology

- **Shot** – the injection of antiprotons from the Accumulator into the Main Injector and on into the Tevatron in preparation for colliding beams operation.
- **Shot Setup** – the sequence of events leading to antiproton shots.

The Accelerator Chain



Accelerator	Energy
Cockroft Walton	750 keV
Linac	400 Mev
Booster	8 GeV
Main injector	150 GeV
TEVATRON	980 GeV

Shot Setup Overview

- At the end of the previous store:
  - Finish data taking run
  - Before the previous store is dumped, ramp down high voltage (allow 5 minutes)
  - The Main Control Room (MCR) should notify CDF in advance of planned beam dumps.

Shot Setup Overview

- Between one store and the next:
  - Assume sufficient pbars to go again(>100mA)
  - Time between shots:
    - ~2-3 hours if things are going well
    - Beams Division goal is 1 hour
  - Calibrations (Quiet time ?)

Shot Setup Overview

- Beginning of the next store:
  - Protons are injected first, then pbars
  - Accelerate beams to 980 GeV
  - Cogging
  - Low Beta Squeeze
  - Scraping
- Once losses are low and the beam is stable, Ramp the HV and begin taking data

Shot Setup Overview

- **Injection** – the process of transferring protons or antiprotons from the Main Injector to the Tevatron (4 bunches at a time)

- **Ramping** – the magnetic fields of the magnets are increased simultaneously, boosting proton/pbar energies from 150 GeV to 980 GeV ("flattop")

Shot Setup Overview

- **cogging** – the process of spacing the bunches of protons or pbars in the TeVatron so that they collide at the proper points in the ring.
- **low beta squeeze** – after injecting protons and pbars into the TeVatron, a special set of quadrupoles are turned on at B0 to reduce the size of the beam and increase luminosity.
- **scraping** – using colliminators to remove the beam "halo" and reduce losses.
  - MCR will notify CDF when scraping is complete, but you should be monitoring the ACNET variable T:VSCRAP too !

What to watch in ACNET

When the shot is going in…

C:BOPLOS B0 proton losses from BSC (Hz)
C:BOALOS B0 pbar losses from BSC (Hz)
C:LOSTP - proton losses fast response (Hz)
C:LOSTPB- pbar losses fast response (Hz)
C:BOILUM - B0 delivered instantaneous luminosity (E30 cm^{-2} s^{-1})
C:BOQ5 - Current in low beta quads (Amps)
T:ERING - Tevatron energy (GeV)
T:IBEAM - Tevatron beam current (E12)
E:SVRAD(0-3) – SVX integrated radiation dose (rad)
E:SVBLA(0,1), SVBLB(0,1) – SVX instantaneous rates (rad/s)

Andy Hocker will talk about Silicon radiation monitoring in Thursday's training session.

During the store also monitor…

C:BOILUM – Delivered instantaneous luminosity (E30 cm^{-2} s^{-1})
C:BOLLUM - Live instantaneous luminosity (E30 cm^{-2} s^{-1})
C:BOTLUM - Integrated delivered luminosity (nb^{-1})
C:BOTLIV - integrated live luminosity(nb^{-1})

What to watch in ACNET

To measure losses in silicon detectors

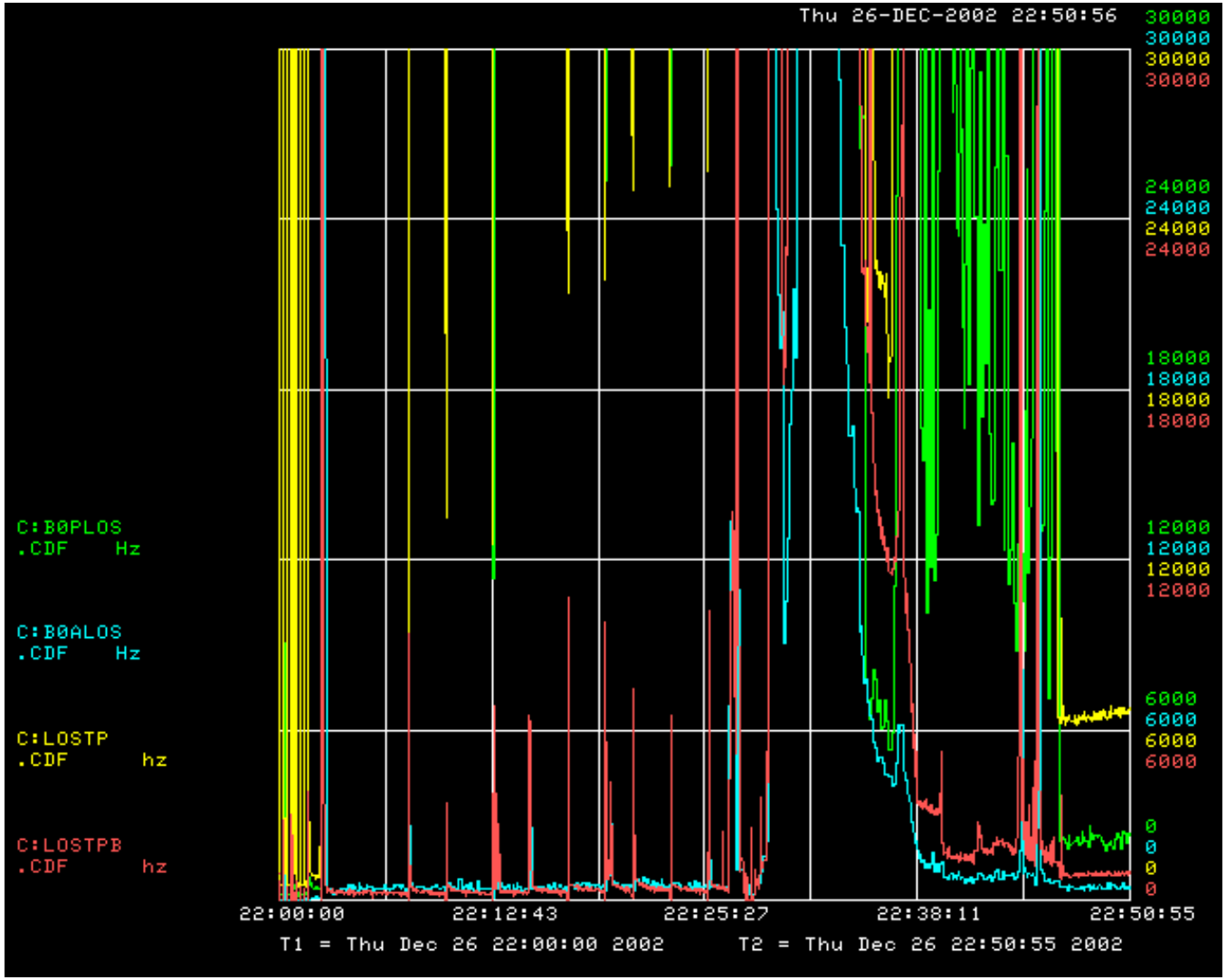
E:SVRAD0 – west inner BLM integrated radiation dose (rad)
E:SVRAD1 – west outer BLM integrated radiation dose (rad)
E:SVRAD2 – east inner BLM integrated radiation dose (rad)
E:SVRAD3 – east outer BLM integrated radiation dose (rad)

E:SVBLA1 – west inner BLM instantaneous loss rate (rad/s)
E:SVBLA2 – west outer BLM instantaneous loss rate (rad/s)
E:SVBLB1 – east inner BLM instantaneous loss rate (rad/s)
E:SVBLB2 – east outer BLM instantaneous loss rate (rad/s)

Acnet page E20 allows you to monitor the current values of the instantaneous and integrated dose rates

Store 2105: losses during shot setup
(ACNET page E11 E-Z writer)

C:B0PLOS
C:B0ALOS
C:LOSTP
C:LOSTPB



Store 2105: losses during shot setup
(owl shift elog)

2002.12.26 21:59:19 E Outer BLM 3.70 RADS

Integrated dosage - Hirokazu Kobayashi

-- *Thu Dec 26 22:05:24 comment by...Hiro* -- All proton bunches have loaded. And anti-proton bunches are loading.

Thu Dec 26 22:30:11 Run 155816 TERMINATE: TeV at flattop. - Vivek

Thu Dec 26 22:31:30 RC in IDLE state till scraping done to judge losses. - Vivek

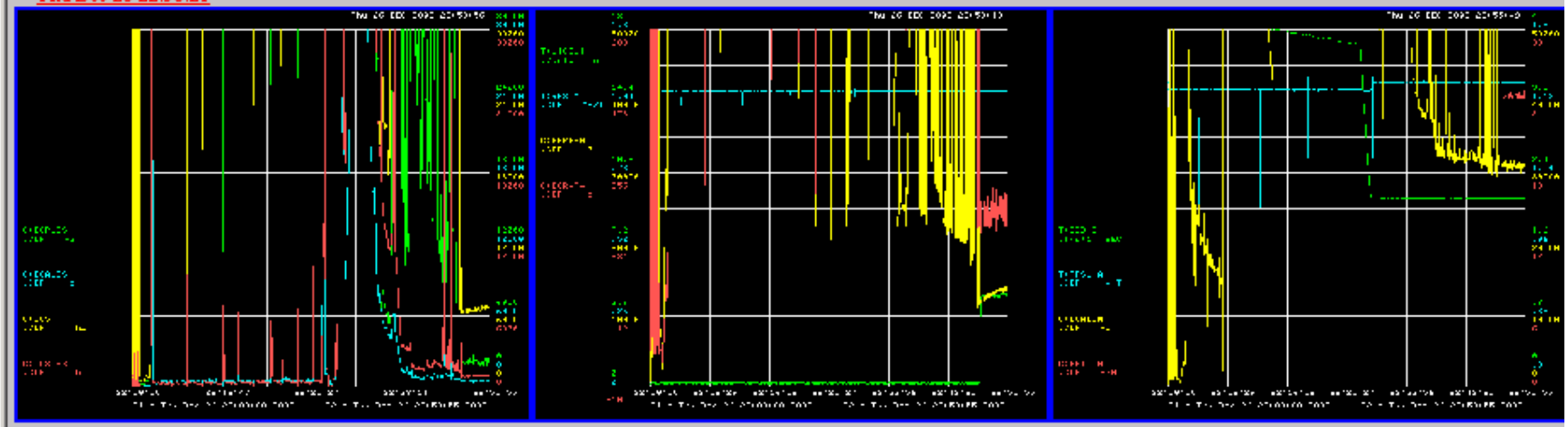
Thu Dec 26 22:51:16 Scraping was done at 22:47. - kondo

-- *Thu Dec 26 22:55:59 comment by...kondo* -- TeVPR=6617E9, TeVPB=623.7E9. Initial B0 Luminosity=24.7E30

-- *Thu Dec 26 23:00:02 comment by...kondo* -- B0PLOS=2.3kHz, B0PBLOS=400Hz.

-- *Thu Dec 26 23:05:40 comment by...Hiro/Vivek* -- CMX tripped. We could recovered it.

Thu Dec 26 22:58:21



- Hirokazu Kobayashi

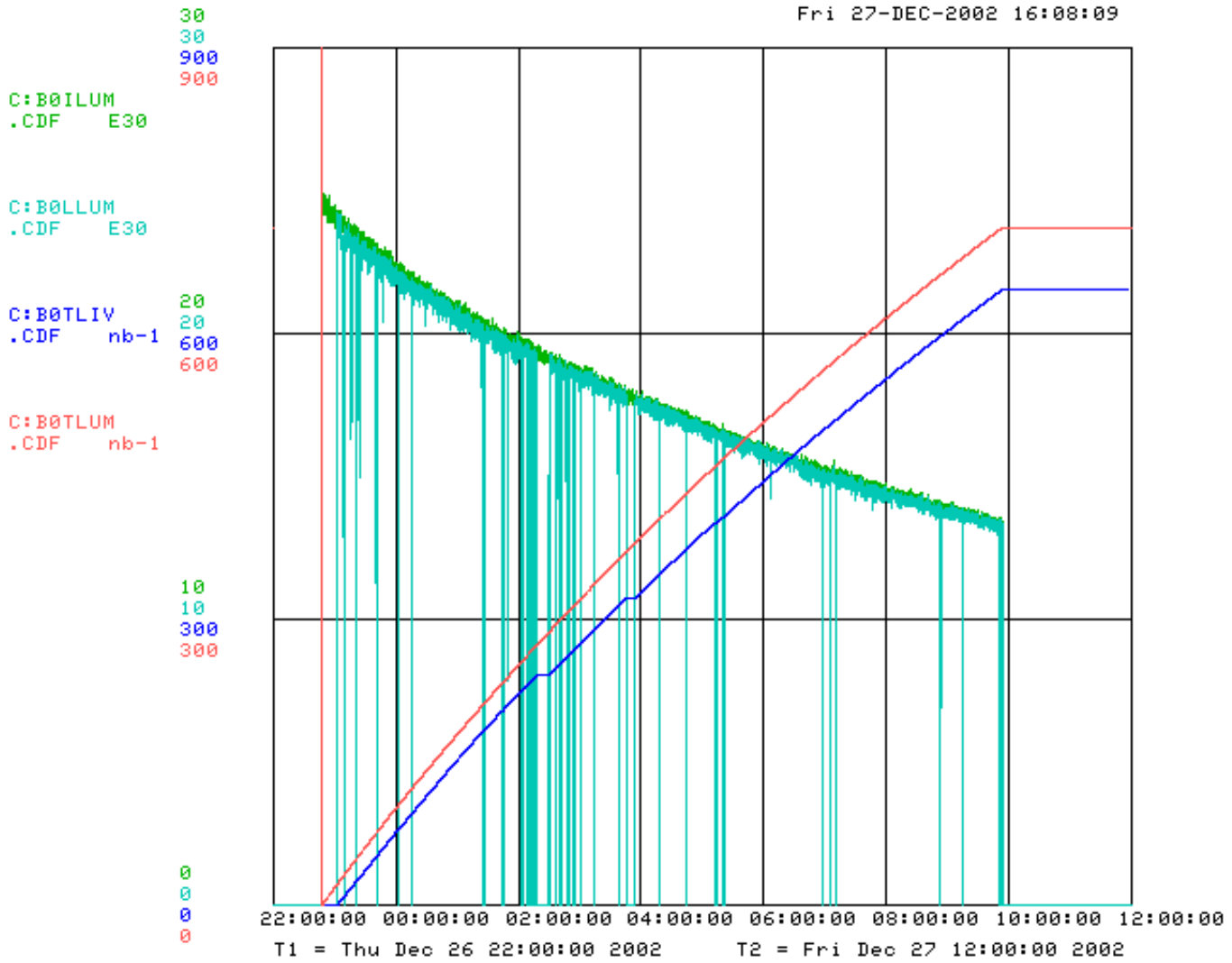
Thu Dec 26 23:00:02 Run 155818 Activated at 2002.12.26 22:59:50 - RunControl

Thu Dec 26 23:00:30 Run 155818 ACTIVATE: Start w/ silicon. - Vivek

Thu Dec 26 23:09:14 Started w/ silicon in 13 minutes from scraping done. But lost ~2 minutes due to successive done timeouts from b0musc00. Halted the run after trying HRRs and used "Reset, Reboot and Recover feature" of the run control to get back to data taking. - Vivek :: (run 155818)

Store 2105: luminosity during the store
(ACNET page D44 Lumberjack plotter)

C:B0ILUM
C:B0LLUM
C:B0TLIV
C:B0TLUM



Shot setup checklist

www-cdfonline.fnal.gov/opshelp/ShotSetupChecklist_current.html

CDF Shot Setup Checklist v2.6

date_____ **Store#**_____

http://www-cdfonline.fnal.gov/opshelp/ShotSetupChecklist_v26.html
Revised 17 February-2003

Instructions:

*Use this checklist during shot setup. File completed this form in a Shot Setup folder.
*Record entries in the shift elog.
*Recording times in the boxes is useful when communicating information during shift changes.

1) Before a store (Many steps can be performed simultaneously.)

* time:_____ About 1 hour before shot setup begins, check that the solenoid is on, or ramping.
* Check the solenoid field in rack 2RR06B in the control room (red digits). This should read ~ **13750** gauss **(_____gauss)**.
* (b) Check the solenoid current on the IFIX terminal in the same rack. This should read **4650** amps**(_____amps)**.
If the solenoid is not on, call the Cryo Tech (x3632) and ask them to ramp the solenoid. It takes about 1 hour to ramp to full field.

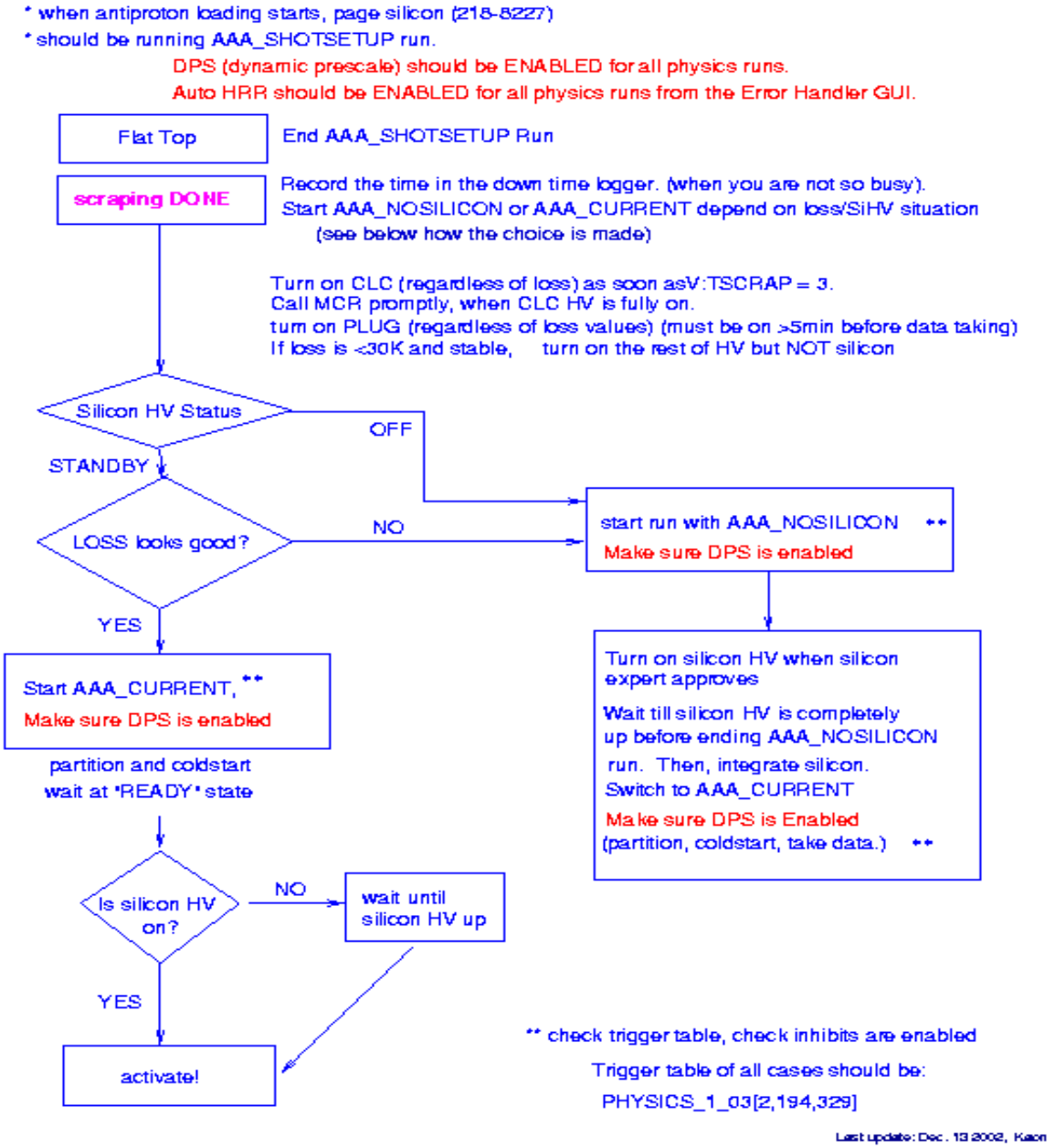
* time:_____Check that the silicon radiation protection is active. On ACNET page E20, check that **Fifos Recording** is present. If not, page the silicon radiation monitoring expert (266-2713).
* time:_____Check that the HV is in the following configuration:
    * **Off:** TOF, MNP, CLC
    * **Standby:**COT, SVX*, ISL, L00, CMU, CMP, CMX, BMU, CES, CPR, CCR, PEM, PHA, PSH
    * Raising silicon from off to standby is an EXPERT ONLY operation.
    * **On:** CEM, CHA, WHA, GAM, BSC, RPS.
* time:_____Verify that the master clock is set to **NORMAL** run mode. The clock module is on the left-hand side of the bottom crate of rack 2RR22I in the trigger room. The green light for **NORMAL** run mode should be on. If the mode is incorrect, page the Operations Manager (314-4862).

Also, check that the Tevatron Beam Sync delay in ACnet is correct. This is parameter C:TEVSYN, which you can find listed on E64, Stores, subpage 2. The correct value is 0.881 MREV. If this is not the value, page the Operations Manager.

* Make sure that dynamic prescaling (**DPS**) is ENABLED in the scaler GUI.
* time: Take a cosmic ray run with all working crates **(Run Number)**

www-cdfonline.fnal.gov/opshelp/shotsetup_flow.ps

shotsetup flow chart (with Silicon)



Resources

Shot setup checklist:

www-cdfonline.fnal.gov/opshelp/ShotSetupChecklist_current.html

Shot setup flowchart:

www-cdfonline.fnal.gov/opshelp/shotsetup_flow.ps

Helpful Beams Info:

www-bdnew.fnal.gov/operations/rookie_books/rbooks.html

www-bd.fnal.gov/runII/index.html